



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

Breckland Special Protection Area (SPA)
Site code: UK9009201



Cavenham Heath Natural England

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About this document

This document provides Natural England's supplementary advice for the European Site Conservation Objectives relating to Breckland SPA. This advice should therefore be read together with the SPA Conservation Objectives available [here](#).

Where this site overlaps with other European Sites, you should also refer to the separate European Site Conservation Objectives and Supplementary Advice (where available) provided for those sites.

This advice replaces a draft version dated 16 January 2019 following the receipt of comments from the site's stakeholders.

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Breckland Special Protection Area (SPA)
Location	Norfolk, Suffolk
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	21 September 2006
Qualifying Features	See section below
Designation Area	39,433.66 ha
Designation Changes	N/A
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Barnham Heath SSSI Barnhamcross Common SSSI Berner's Heath, Icklingham SSSI Breckland Farmland SSSI Breckland Forest SSSI Bridgham & Brettenham Heaths SSSI Cavenham - Icklingham Heaths SSSI Cranberry Rough Hockham SSSI Cranwich Camp SSSI Deadman's Grave, Icklingham SSSI East Wretham Heath SSSI Eriswell Low Warren SSSI Field Barn Heaths, Hilborough SSSI Foxhole Heath, Eriswell SSSI Gooderstone Warren SSSI Grime's Graves SSSI How Hill Track SSSI Lakenheath Warren SSSI Little Heath, Barnham SSSI Old Bodney Camp SSSI Rex Graham Reserve SSSI Stanford Training Area SSSI Thetford Golf Course & Marsh SSSI Thetford Heaths SSSI Wangford Warren and Carr SSSI Weather and Horn Heaths SSSI , Eriswell SSSI Weeting Heath SSSI West Stow Heath SSSI
Relationship with other European or International Site designations	A significant number of the underpinning SSSIs are also components of the Breckland SAC
Other information	Standard Natura 2000 Data Form

Site background and geography

The Breckland SPA is located in parts of both Norfolk and Suffolk in the heart of East Anglia. It forms part of [The Brecks National Character Area](#) (NCA 85), which has an ages-old identity, a very particular land use history and a richly distinctive wildlife, which sets it apart from all surrounding landscapes.

The area consists of a gently undulating plateau underlain by a bedrock of Cretaceous Chalk, which is covered largely by thin deposits of sand and flint of glacial origin. The semi-continental climate, with low rainfall and free-draining soils, has led to the development of dry heath and grassland communities. The complex of soils has led to the creation of intimate mosaics of heather dominated heathland with acid and calcareous grassland rarely found elsewhere.

The remnants of the dry heath and grassland that remain within the SPA today support populations of Annex 1 heathland breeding birds, where grazing by sheep and rabbits is sufficiently intensive to create short turf and open ground. Since their introduction by the Normans rabbits have flourished on the dry, sandy soils of Breckland, and a tradition of warrening (essentially enclosed rabbit farms) was established across large parts of the area from the medieval period, and continued well into the late 19th century.

The Annex 1 breeding bird species have also adapted to live in arable and forestry habitats, which cover extensive areas of the SPA. In the 19th century Breckland was termed a sandy waste, with small patches of arable cultivation that were soon abandoned. However, advances in agriculture during the 20th century have enabled the dry, low-fertility soils to be farmed. The area is now a major producer of vegetables and cereals, together with livestock rearing, especially pigs and poultry and lowland grazing, primarily with sheep. A substantial proportion of this arable land occurs within the Breckland SPA.

In addition to the arable and grass heath habitats, a significant part of the Breckland SPA is characterised by large-scale commercial conifer plantations. Most of the forestry was planted during the first half of the 20th Century on land that was either heathland, old rabbit warrens and poor agricultural ground. It now forms the largest area of lowland conifer forest in England.

The regular, rotational clear-felling of select areas of plantation forest creates suitable breeding habitat for SPA bird species which utilise the early years of re-planted blocks. Whilst this commercial practice seeks to secure a more even timber supply through smoothing out peaks and troughs, it also supports SPA species. Areas of heathland created and maintained within the forestry areas create more permanent areas suitable for breeding and feeding of all three SPA species, with an open mosaic of forest and heath.

About the qualifying features of the SPA

The following section gives you additional, site-specific information about this SPA's qualifying features. These are the individual species of wild birds listed on Annex I of the European Wild Birds Directive, and/or the individual regularly-occurring migratory species, and/or the assemblages (groups of different species occurring together) of wild birds for which the SPA was classified for.

Qualifying individual species listed in Annex I of the Wild Birds Directive:

During the breeding season the SPA regularly supports the following species:

- **A133. *Burhinus oedicephalus*; Stone-curlew (Breeding)**

When classified, the SPA supported 115 breeding pairs (5 year mean 1994 – 1998) which represented 60.1% of the GB population,

- **A224. *Caprimulgus europaeus*; European nightjar (Breeding)**

When classified, the SPA supported 415 males breeding (Count as at 1998) which represented 12.2% of the GB population

- **A246. *Lullula arborea*; Woodlark (Breeding)**

When classified, the SPA supported 430 breeding pairs (Count as at 1997) which represented 28.7% of the GB population.

Stone curlew breed on the heaths and grassland, as well as on the arable land and occasionally within conifer plantations, especially on areas of heath created within the forest. Woodlark also utilise the open grassland and heather heaths for breeding and occasionally nest on the margins of arable areas. In recent times they have taken to nesting on fallow land and the system of rotational clear-felling within the conifer plantations also provides ideal breeding conditions for woodlark. Outside the confines of the forest woodlark use both grasslands and arable land for feeding. Nightjar by contrast breed almost exclusively in afforested land, particularly in clear-fells and young plantations, and use open heaths and grasslands together with some arable land outside of the forest for feeding.

All three species use resources outside their immediate breeding areas in the SPA, with stone curlews using arable land and heaths for post-breeding flocks, while some woodlarks remain within the SPA for winter feeding.

Site-specific seasonality of SPA features

The table below highlights in grey those months in which significant numbers of each mobile qualifying feature are most likely to be present at the SPA during a typical calendar year. This table is provided as a general guide only.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SPA outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying bird features during the principal periods of site usage by those features. The months which are **not** highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information. Additional site-based surveys may be required.

Feature	Season	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Site-specific references where available
Stone-Curlew	Breeding	Summer													
Woodlark	Breeding	Summer													
Nightjar	Breeding	Summer													

Guide to terms:

Breeding – present on a site during the normal breeding period for that species

Non-breeding - present on a site outside of the normal breeding period for that species (includes passage and winter periods).

Summer – the period generally from April to July inclusive

Passage - the periods during the autumn and spring when migratory birds are moving between breeding areas and wintering areas. These periods are not strictly defined but generally include the months of July – October inclusive (autumn passage) and March – April inclusive (spring passage).

Winter - the period generally from November to February inclusive.

Table 1: Supplementary Advice for Qualifying Features: A133. *Burhinus oedicnemus*; Stone-curlew (Breeding)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
Breeding population within the SPA	Population abundance	Maintain the size of the breeding Stone Curlew population above 144 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	This target is required to sustain the stone curlew population and ensures that it contributes to a viable local, national and bio-geographic population. A significant proportion of the Stone Curlew population in Breckland are known to nest outside the SPA; this is primarily on arable land. Nesting birds outside of the SPA boundary may form part of the wider population but are protected separately by Schedule 1 of Wildlife & Countryside Act, 1981 as amended, and / or SSSI protection if nesting within a SSSI. Due to the mobility of birds and the dynamic nature of population change, the target-value given for the population size of this feature is considered to be the minimum standard for conservation/restoration measures to achieve (subject to natural changes). The minimum-value may be revised where there is evidence to show that a population's size has significantly changed as a result of natural factors or management measures, and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature. Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current abundance of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is classified, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration. Maintaining or restoring bird abundance depends on the suitability of the site. However, factors affecting suitability can also determine other demographic rates of birds using the site including survival (dependent on factors such as body condition which influences the ability to breed or make foraging and / or migration movements) and breeding productivity. Adverse anthropogenic impacts on either of these rates may precede changes in population abundance (e.g. by changing proportions of birds of different ages) but eventually may negatively affect abundance. These rates can be measured or	

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			estimated to inform judgements of likely impacts on abundance targets. Unless otherwise stated, the population size will be that measured using standard methods such as peak mean counts or breeding surveys. This value is also provided recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise on whether the figures stated are the best available.	
Supporting habitat (both within and outside the SPA): disturbance	Disturbance caused by human activity	Ensure the frequency, duration and/or intensity of disturbance affecting nesting and/or foraging birds should not reach levels that significantly affect the Stone Curlew population.	The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. Such disturbing effects can for example result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites and desertion of supporting habitat (both within or outside the designated site boundary where appropriate). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, and presence of people, animals and structures. Stone Curlew are known to be sensitive to human-related disturbance. Several research projects have looked at the impact of anthropogenic disturbance on the distribution of Stone Curlew nests in Breckland. The research found that Stone Curlews are highly susceptible to disturbance with active responses being recorded at distances of up to 500m from a dog walker (Taylor <i>et al.</i> 2007). A further study carried out by Sharp <i>et al.</i>, 2008 found that Stone Curlew nest density was consistently lower on arable land around settlements up to a distance 2500m. This consistency across the whole study period (1988 – 2006) provides strong long-term evidence of some negative impacts or association of housing on Stone Curlew densities on arable land. Similarly, a significant avoidance of trunk roads was also found. The research was used to inform a comprehensive study undertaken by Breckland Council as part of the Habitat Regulations Assessment (HRA) of its Core Strategy. As a result of the HRA a 1500m constraints zone has been being put in place around those parts of the Breckland SPA boundary that supports or is capable of	TAYLOR, E. C., GREEN, R. E. & PERRINS, J. (2007) Stone curlews <i>Burhinus oedicephalus</i> and recreational disturbance: developing a management tool for access. <i>Ibis</i> 149:37-44. SHARPE, J., CLARKE, R. T., LILEY, D. & GREEN, R. E. (2008) The effect of housing development and roads on the distribution of stone curlews in the Brecks: Evidence to support the Appropriate Assessment of development plans and projects in Breckland. Unpublished report, Footprint Ecology, Wareham Dorset LILEY, D., HOSKIN, R., UNDERHILL-DAY, J. & TYLDESLEY, D. (2008). Habitat Regulations Assessment: Breckland

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			supporting stone curlew. In addition to the 1500m zone a second buffer has been established to capture areas frequently used by nesting Stone Curlew outside of the SPA, but which form part of the SPA population. These areas were selected from 1km grid cells which held at least 5 nests during the period 1995 – 2006. The constraint zone has been adopted by all the local authorities where the SPA boundary falls under their jurisdiction but does not apply a blanket ban on development. Research carried out by Clarke <i>et al</i>, 2013 following the establishment of the constraint zone reaffirmed the initial findings and provided further evidence on the effects that built development has on the Stone Curlew population in Breckland. Within the constraints zone permission may be granted where: - the re-use of existing buildings and development that will be completely masked from the SPA by existing development; - it can be demonstrated through an appropriate assessment that the development will not adversely affect the integrity of the SPA. Nesting stone curlews can be affected by disturbance that occurs within 1500m of them. The cumulative effect of new housing within the 1.5km constraints zone therefore has the potential to lead to an increase in urban pressures on parts of the SPA with a risk of harmful effects to stone curlew. A strategic approach to mitigating these potential impacts arising from new housing is being explored by Natural England, with appropriate consultation with local planning authorities and other stakeholders anticipated.	Council Submission Core Strategy and Development Control Policies Document. Footprint Ecology, Wareham, Dorset. Report for Breckland District Council. CLARKE, R. T., SHARP J. M., LILEY, D. & GREEN, R. E. (2013) Building Development and Roads: Implications for the Distribution of Stone Curlews across the Brecks.
Supporting habitat (both within and outside the SPA): function/ supporting process	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for the supporting habitat of this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	The structure and function of habitats which support this SPA feature may be sensitive to changes in air quality. Exceeding critical values for air pollutants may result in changes to the chemical status of its habitat substrate, accelerating or damaging plant growth, altering vegetation structure and composition and thereby affecting the quality and availability of nesting, feeding or roosting habitats. Critical Loads and Levels are thresholds below which such harmful effects on sensitive UK habitats will not occur to a noteworthy level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement	More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk)

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			technology and measures to tackle diffuse air pollution, within realistic timescales. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. Grass heath vegetation in Breckland is dependent on low nutrient conditions and is thus vulnerable to aerial nitrogen deposition. The region has one of the highest levels of deposition in Britain, with the current critical load being 10-20 kg N/ha/yr. An increase in nitrogen deposition changes the diversity and composition of vegetation, with the result that less competitive species are replaced by those of a more vigorous nature. The reduction in the level of short vegetation and bare ground favoured by Stone Curlew reduces the amount of available nesting and feeding habitat. Management techniques to mitigate nitrogen accumulation impacts are imperfectly understood, but the use of soil disturbance, turf stripping and encouraging high density rabbit populations are approaches being trialled in Breckland.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Connectivity with supporting habitats	Maintain the safe passage of breeding stone curlew moving between nesting and feeding areas.	The ability of the feature to safely and successfully move to and from feeding and roosting areas is critical to their breeding success and to the adult fitness and survival. This target will apply both within the site boundary and where birds regularly move to and from off-site habitat to roost or feed (also known as 'functionally-linked land') where this is relevant.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	Maintain management (whether within and/or outside the site boundary as appropriate) necessary to maintain the structure, function and supporting processes associated with the feature and its supporting habitat.	Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target. Further details about the necessary conservation measures for this site can be provided by Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Conservation measures:	This attribute will be periodically monitored as part of Natural England's site condition assessments. JOHNSON, A. (2009). Demographic Analysis of the Impact of Conservation Action on Stone Curlew Population. PhD Thesis. University of

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			- Maintenance of sward height on semi-natural grassland of (<2cm for nesting and 5cm for feeding) through intensive grazing by both livestock and rabbits. - Maintenance of bare/disturbed ground on semi-natural grassland through a range of intermittent physical disturbance techniques e.g. rotovating, ploughing, turf-stripping. - Encouraging the expansion of rabbit populations on semi-natural grassland through the use of brash piles (artificial warrening structures), forage harvest track ways between brash piles (to encourage rabbit dispersal), and some level of sheep grazing. - Creation/maintenance of nest plots primarily via the 'fallow plot for ground nesting bird' option in agri-environment schemes to provide safe nesting and chick rearing habitat on arable land. Stone-curlews have an extended breeding season so the aim is to create suitable bare/sparsely-vegetated ground conditions to enable multiple nesting attempts and the rearing of two broods. This is achieved by establishing two hectare fallow nest plots prior to the birds returning from their wintering grounds and managing them throughout the breeding season to ensure open conditions are maintained. The plots are effective in arable fields but are even more valuable when placed in grassland as they provide both nesting and foraging habitat in close proximity. - Liaison with farmers to ensure plots are being managed appropriately and remain suitable for stone curlew until the end of the breeding season. Plots that become too overgrown (i.e. more than 60% ground cover by 15 May) should be managed by spraying the vegetation with a suitable herbicide. - Monitoring of core areas and targeted interventions on cropped land, where necessary, within and outside the SPA by suitably qualified people. Interventions include nest avoidance and holding chicks during farming operations, changes made to timings or types of farming operations specifically to protect nests or chicks, and clearance of crops or weeds from around nests.	Cambridge NATURAL ENGLAND (2015). Site Improvement Plan: Breckland (SIP025). http://publications.naturengland.org.uk/publication/5075188492271616 ENGLISH NATURE, 2005. Views about Management of Breckland SSSIs (see (See Natural England's Designated Sites System)).
Supporting habitat (both	Food availability	Maintain the distribution, abundance and	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population.	GREEN, R. E., TYLER G. A. AND BOWDEN C. G.

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
within and outside the SPA): function/supporting process	within supporting habitat	availability of key prey items (e.g. beetles, grasshoppers, flies, earthworm, snails, and slugs) at prey sizes preferred by Stone Curlew.	As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population.	R., (2000) Habitat selection, ranging behaviour and diet of the stone curlew (<i>Burhinus oedicnemus</i>) in southern England. <i>J. Zool.</i> , Lond. (2000) 250, 161±183
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain the area of open and unobstructed terrain around nesting, roosting and feeding sites used by breeding Stone Curlews.	Stone Curlew are known to favour large areas of open terrain, largely free of obstructions, in and around its nesting, roosting and feeding areas. Often there is a need to maintain an unobstructed line of sight within nesting, feeding or roosting habitat to detect approaching predators, or to ensure visibility of displaying behaviour. An open landscape may also be required to facilitate movement of birds between the SPA and any off-site supporting habitats.	
Supporting habitat (both within and outside the SPA): structure	Vegetation characteristic	Maintain/ the proportion of short <2cm to 5cm grass heath vegetation Maintain bare/sparsely vegetated ground of between 5-20% within nesting areas on grass heath	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/rearing/concealment/roosting. Many bird species will have specific requirements that conservation measures will aim to maintain, for others such requirements will be less clear. Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these characteristics may adversely affect the feature. Stone Curlews have historically preferred nesting on semi-natural dry grassland and heaths. However the area of open semi-natural habitat declined significantly during the 2nd half of the 20th Century as a result of land being converted to farmland and forestry, and a large proportion of the Breckland population now nest on arable land both within and outside the SPA. Stone Curlew preferentially select grassland and heath sites with a sandy soil and a sward height of less than 5cm which is sufficiently short for the birds to forage for invertebrates, but nesting only usually occurs where the sward height is less than 2cm. In Breckland the birds locate their nests in areas of bare, stony soil to aid camouflage which is often a result of soil disturbance. Bare/disturbed ground may be maintained or created by rabbit and mole activity or through mechanical means such as rotoavation, ploughing, and turf stripping. 16 ha of suitable habitat is required per pair (Green & Ausden, 2009). At least 50% of each 16ha should be suitable for nesting (i.e. sward height <2cm), e.g. through a combination of rabbit grazing, sheep grazing, and/or mechanical disturbance. The remainder should be suitable for feeding (<5cm), or at least	This attribute will be periodically monitored as part of Natural England's site condition assessments. GREEN, R. E., TYLER G. A. AND BOWDEN C. G. R., (2000) Habitat selection, ranging behaviour and diet of the stone curlew (<i>Burhinus oedicnemus</i>) in southern England. <i>Journal of Zoology</i> 250, 161±183 GREEN, R. E. & GRIFFITHS, G. H. (1994) Use of preferred nesting habitat by stone curlews <i>Burhinus oedicnemus</i> in relation to vegetation structure. <i>Journal of Zoology</i>, 233, 457-471.

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			predominantly so. Bare ground/sparse vegetation is an essential component of the grassland habitat favoured by a range of characteristic Breckland flora and fauna including ground nesting birds such as Stone Curlew. A minimum of 5% is considered necessary to support species which thrive in open, disturbed conditions, but for Stone Curlew this should be 5% per 100ha of grassland or heathland. Bare/sparsely vegetated areas >20% should not normally be deemed unfavourable, provided other site features are not negatively impacted. Areas maintained by rabbits may exceed 20% cover, but is likely to be temporary with the natural dynamism of rabbit populations.	
Supporting habitat (within the SPA): extent and distribution	Extent and distribution of supporting habitat for the breeding season	Maintain the extent, distribution and availability of suitable breeding habitat which supports the breeding Stone Curlew feature for all necessary stages of its breeding cycle (courtship, nesting, feeding). Grass heath within SPAs 16ha of suitable habitat per pair (Green and Ausden, 2009), based on the SSSI population baseline figure of number of pairs for each of the underpinning SSSI. Farmland within SPA: 9864.06ha of arable farmland (open stony or sandy ground with sparse vegetation and	To maintain or restore the extent of supporting habitats and their range in order to maintain the population. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending to the nature, age and accuracy of data collection. Grass heath within SPA; The average density for breeding Stone Curlew on short semi-natural grassland and heath in Breckland is 1 pair per 16 ha, as determined by Green and Ausden (2009). At least 50% of each 16ha should be suitable for nesting (i.e. sward height <2cm), e.g. through a combination of rabbit grazing, sheep grazing, and/or mechanical disturbance. The remainder should be suitable for feeding (<5cm), or at least predominantly so. Land within Farmland SSSI/SPA; The extent for the SSSI is derived from the estimate of arable land and arable reversion within Breckland ESA as determined by DEFRA (1995). Approximately 70% of the stone curlew population in Breckland nest within the Breckland Farmland SSSI, typically in areas of summer fallow or spring sown crops such as sugar beet, root vegetables, spring barley and maize. Stone curlews also nest on patches of bare stony ground or sparsely vegetated (< 2 cm high) turf, sheep or rabbit grazed semi-natural grassland and heath or improved pasture. The overall area of suitable habitat with the correct vegetation characteristics for nesting should not decrease from the reference level, although the distribution may alter as birds change their nesting locations to follow the availability of suitable nesting areas following changes in cropping rotation (within and between	This attribute will be periodically monitored as part of Natural England's site condition assessments. GREEN, R.E. & AUSDEN, M. (2009), Area of short semi-natural grassland required per pair of breeding stone curlews in Breckland (RSPB Unpublished paper) DEFRA, 1995. Breckland SSSI Arable Land Cover Map. Available from Natural England on request DEFRA 1995 Land Cover Periods Available from Natural England on request

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
		bare soil) (DEFRA1995). 388.89ha lowland grassland (DEFRA, 1995). 4.79ha heather heathland (DEFRA, 1995).	seasons). Land outside SPA A significant proportion of the Stone Curlew population in Breckland are known to nest and forage outside the SPA. This is primarily on arable land and Natural England and RSPB have jointly developed farm by farm targets (both within and outside the SPA). These are focused on increasing the area of 'safe nesting habitat through the provision of nest plots specifically managed for Stone Curlew via the 'fallow plots for ground nesting bird' option in agri-environment agreements. Areas of grassland/heathland within agri-environment agreements (both within and outside the SPA) may also be targeted. These areas are usually managed in line with the prescriptions for a range of grassland options.	
Supporting habitat (within the SPA): predation	Predation	Reduce the predation of and disturbance to breeding Stone curlew caused by native and non-native predators.	This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that maintain or restore the abundance of the feature. Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also from significant disturbance. The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control. Any such measures must consider the legal protection of some predators. At least 0.7 fledged young per year per breeding pair of Stone Curlew is needed to maintain the Stone Curlew population in Breckland.	GREEN, R.E., HODSON, D.P., AND HOLNESS, P.R. (1997) Survival and movements of Stone-curlews <i>Burhinus oediconemus</i> ringed in England. <i>Ringling & Migration</i>, 18, p.102-112.
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	This recognises the increasing likelihood of supporting habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England Available at

Attributes		Targets	Supporting and/or Explanatory Notes	Sources of site-based evidence (where available)
			by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability. The overall vulnerability of this SPA to climate change has been assessed by Natural England (2015) as being low, taking into account the sensitivity, fragmentation, topography and management of its supporting habitats. This means that this site is considered to be vulnerable overall but are a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.	http://publications.naturalengland.org.uk/publication/4954594591375360
Version Control 7 March 2019. Table updated reflecting stakeholder feedback; Population abundance: clarity provided about protection afforded to stone curlews nesting outside of the SPA; Disturbance caused by human activity: additional information provided regarding constraints zone; Predation: productivity level of fledged young amended				
Variations from national framework of integrity-guidance: All three species are associated with terrestrial habitats and therefore the attribute relating to features dependent on the quality and quantity of surface water has been removed.				

Table 2: Supplementary Advice for Qualifying Features: A224. *Caprimulgus europaeus*; European nightjar (Breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Breeding population within the SPA	Population abundance	Restore the size of the breeding Nightjar population to a level which is above 415 breeding/ pairs (indicated by churring males), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	See the supporting notes for this attribute in Table 1 above. The Breckland SPA breeding population of Nightjars is cited as 415 breeding/churring males at 1998. Usual practice for setting a Conservation Objective normally relies on several years' data, commonly five consecutive years, which is presented as a mean value. In the case of less well monitored species, it may be necessary to use a single year's data to establish a population baseline. Nightjar monitoring is not frequent, and prior to notification the most recent survey was in 1998. It is the population present in that survey which is used here to set the population baseline. Nightjar and woodlark were at unusually high population levels at this point due to unsustainable levels of habitat availability. In Thetford Forest habitat (open/felled/ re-stock) availability peaked in the 1980s and 90s when the first forest plantings reached economic maturity and were harvested in a narrow time window. This has led to unrealistically high baseline numbers. Since then both Woodlark and Nightjar numbers have declined in the SPA. Research has shown this is mainly due to decreased habitat availability. The Forestry Commission are currently working with University of East Anglia to understand potential long-term population levels when based on a 'steady-state' of harvesting within the forest and taking into account the emergence of tree diseases and projected climate change forecasts, both of which are likely to drive a significant change in silviculture i.e. reduction of rotational clear fell. The population baseline may be revised in light of this work.	CONWAY, G. & HENDERSON, I. 2010. Forest Nightjar <i>Caprimulgus europaeus</i> Survey 2010. BTO Research Report No 569) EVANS, M. 2002. GIS-based modelling of woodlark (<i>Lullula arborea</i>) and nightjar (habitats in a Forested Landscape. PhD thesis, University of East Anglia, Norwich. DOLMAN, P. & MORRISON, C. 2012. Temporal Change in Territory Density and Habitat Quality for Breckland Forest SSSI Woodlark and Nightjar Populations. Unpublished report for Forestry Commission and Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat (both within and outside the SPA): disturbance	Disturbance caused by human activity	Ensure the frequency, duration and/or intensity of disturbance affecting nesting, roosting and/or foraging birds does not reach levels that significantly affect the breeding Nightjar population.	The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, presence of people, animals and structures. Research studies have shown that Nightjar are sensitive to human-related disturbance, a negative correlation between the numbers of these species and housing was identified i.e. higher density of housing resulted in fewer birds on certain heaths in Dorset (Liley <i>et al.</i>, 2007). Further studies of Nightjar breeding success showed a greater proportion of nests failed on more urban heaths and that nests closer to footpaths were more likely to fail. The research shows that the impact of housing situated close to heaths is more severe than housing that is further away. As a result of these findings a 400m zone around the heaths was proposed within the local plan as a suitable distance at which to totally limit further development around the boundaries of heathland sites. The 400m zone, as selected by Natural England, is regarded as a pragmatic distance to represent the zone of highest potential impact on the SPA from new residential development. The figure is based on a number of different impacts and the difficulty of avoiding their occurrence when housing is adjacent to heaths. In particular: - Residents living very close to the heaths are more likely to visit the heaths than people living further away; - Cats associated with housing adjacent to the heaths may be more likely to visit the heaths; and - Other effects, such as garden waste dumping, garden extensions and fly-tipping from gardens, all occur where housing	DOLMAN, P M., 2010. Woodlark and Nightjar Recreational Disturbance and Nest Predator Study. 2008 and 2009. Final Report to Breckland District Council. University of East Anglia, Norwich. LANGSTON, R.H.W., LILEY, D., MURISON, G., WOODFIELD, E. & CLARKE, R.T. (2007) What effects do walkers and dogs have on the distribution and productivity of breeding European Nightjar <i>Caprimulgus europaeus</i>? Ibis 149, supplement 1: 27–36. LILEY, D., CLARKE, R T., MALLORD, J W., and BULLOCK, J M., 2006a. The Effect of Urban Development and Human Disturbance on the Distribution and Abundance of Nightjars on the Thames Basin and Dorset Heaths. Natural England/Footprint Ecology. LILEY, D., CLARKE, R. T., TYLDESLEY, D.,

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			is adjacent or very close to the heaths. This 400m zone has been adopted by Breckland Council following a comprehensive study undertaken as part of the Habitat Regulations Assessment (HRA) of its Core Strategy. Any development proposal that lies within 400m of the Breckland SPA must be able to demonstrate, through a local level HRA, that the Woodlark and Nightjar interest features of the SPA will not be adversely affected by the proposal. The exclusion zone has subsequently been adopted by all the local authorities where the SPA boundary falls under their jurisdiction.	UNDERHILL-DAY, J. & LOWEN, J. 2007 Evidence to support the Appropriate Assessment of development plans and projects in south-east Dorset Footprint Ecology / Dorset County Council. MURISON, G., 2002. The Impact of Human Disturbance on the Breeding Success of Nightjar <i>Caprimulgus europaeus</i> on Heathlands in South Dorset, England. English Nature, Peterborough. LILEY, D., HOSKIN, R., UNDERHILL-DAY, J. & TYLDESLEY, D. (2008). Habitat Regulations Assessment: Breckland Council Submission Core Strategy and Development Control Policies Document. Footprint Ecology, Wareham, Dorset. Report for Breckland District Council
Supporting habitat (both within and outside the SPA):	Connectivity with supporting habitats	Maintain the safe passage of breeding Nightjar moving between nesting and feeding areas.	The ability of the feature to safely and successfully move between feeding and nesting areas using flight-lines and movement routes is critical to their breeding success and to adult fitness and survival. This target will apply within the site boundary and where birds regularly	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
function/ supporting process			move to and from off-site habitat where this is relevant. The foraging range of Nightjar is known to extend up to several kilometres from their nest sites.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	Maintain management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain the structure, function and/or the supporting processes associated with the feature and its supporting habitats.	Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target. Further details about the necessary conservation measures for this site can be provided by Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSIs and/or management agreements. Conservation Measures: • Maintenance of semi-natural grasslands and heathlands to ensure the availability of sufficient levels of optimal foraging and nesting habitat, together with scrub and tree cover to provide roost sites and song posts. • Maintenance of optimal sward height and sward composition on semi-natural grasslands and heathlands through grazing by livestock and rabbits. • Maintenance of forestry restocks to ensure key nesting habitat in conifer plantation-forest. In Breckland Nightjars predominantly use clearings and young tree crops within forestry plantations, and tend not to use smaller coupe sizes, especially those under 5ha in size. They continue to use young plantations up to 20 years old, with breeding density declining as the crop mature.	This attribute will be periodically monitored as part of Natural England's site condition assessments. NATURAL ENGLAND (2015). Site Improvement Plan: Breckland (SIP025). http://publications.naturalengland.org.uk/publication/5075188492271616 ENGLISH NATURE, 2005. Views about Management Statements for Breckland SSSIs. (See Natural England's Designated Sites System).
Supporting habitat (both within and outside the SPA): function/ supporting process	Food availability within supporting habitat	Maintain the distribution, abundance and availability of key prey items (e.g. moths, beetles) at preferred prey sizes.	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall sustainability of the population. Presence and abundance of night-flying insects, especially moths and beetles, should be maintained within the forest and surrounding semi-natural grasslands and heathlands.	DOLMAN, P., PANTER, C. & MOSSMAN, H. 2010, Securing Biodiversity in Breckland: Guidance for Conservation and Research. First Report of the Breckland

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			On semi-natural grasslands and heathlands, management should achieve a mosaic of sward heights and a high proportion of nectar-rich wildflowers (Dolman <i>et al.</i> , 2010).	Biodiversity Audit. University of East Anglia, Norwich. HENDERSON, I., HUNTER, D. & CONWAY, G. 2018. Comparing moth abundance between the breeding and foraging locations of the European Nightjar <i>Caprimulgus europaeus</i> , in Thetford Forest. A BOU-funded project report. BOU, Peterborough, UK.
Supporting habitat (both within and outside the SPA): function/supporting process	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for the supporting habitat of this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See the explanatory notes for this attribute in Table 1 Grass heath vegetation in Breckland is dependent on low nutrient conditions and is thus vulnerable to aerial nitrogen deposition. The region has one of the highest levels of deposition in Britain, with the current critical load being 10-20 kg N/ha/yr. An increase in nitrogen deposition changes the diversity and composition of vegetation, with the result that less competitive species are replaced by those of a more vigorous nature.	More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk)
Supporting habitat (both within and outside the SPA): structure	Landscape	Restore the amount of open and unobstructed patches within nesting and foraging areas, including areas of clear-fell, windfall, wide tracks, open forest and heath.	Nightjar are known to favour large areas of open terrain, largely free of obstructions, in and around its nesting, roosting and feeding areas. Often there is a need to maintain an unobstructed line of sight within nesting, feeding or roosting habitat to detect approaching predators, or to ensure visibility of displaying behaviour. An open landscape may also be required to facilitate movement of birds between the SPA and any off-site supporting habitat.	
Supporting habitat (within the SPA): extent and	Extent and distribution of supporting breeding habitat	Restore the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle	Conserving and restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and capacity to support the SPA population. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection. Grass	This attribute will be periodically monitored as part of Natural England's site condition assessments .

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
distribution		(courtship, nesting, feeding) Maintain at least 12,752 ha in rotational forest management.	heath within SPA. Grass heath within the SPA Semi-natural grassland and heathland, including those within planted forests, need to be maintained to ensure the availability of optimal foraging and nesting habitat. Birds that choose to nest in restocked forestry blocks will often use open habitats for feeding. There is an ongoing plan to increase the open habitat within the forest to reverse the effects of fragmentation, and to provide optimal foraging grounds to support nesting Nightjar (Open Habitats Implementation Plan for the Forestry Commission). Conifer Plantation Forest within the SPA The large majority of Nightjar nesting in the SPA do so on forest restocks. The overall area of suitable habitat with the correct vegetation characteristics for nesting and feeding should be maintained, although the distribution will vary as areas of plantation mature or are felled. At present, at least 12,752ha in rotational forest management is considered to be needed to ensure the continuity in the extent of nesting habitat. This figure is currently under review and may need to be amended in light of work being carried out by the Forestry Commission in relation to changes in the silvicultural management of the Forest. This is partly driven by the emergence of tree diseases and projected climate change forecasts, both of which are likely to drive a significant change in silviculture i.e. reduction of rotational clear fell	Forestry Commission, 2014. Open Habitats Implementation Plan - Thetford Public Forest Estate
Supporting habitat (within the SPA): predation	Predation	Reduce predation of and disturbance to breeding Nightjars caused by native and non-native predators.	This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that maintain or restore the abundance of the feature. Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also from significant disturbance. Nightjar nests in the Breckland SPA are primarily predated by mammalian predators, such as fox and badger. High nest predation rates remain an important aspect of population demography and numbers	DOLMAN, P M., 2009. Woodlark and Nightjar Recreational Disturbance and Nest Predator Study. 2008 and 2009. Final Report to Breckland District Council. University of East Anglia, Norwich.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			within the Breckland SPA. The presence of such predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control. Any such measures must consider the legal protection of some predators, as well as the likely effects of such control on other qualifying features.	
Supporting habitat (within the SPA): structure	Vegetation characteristic	Restore the mix of vegetation (optimal conditions normally with vegetation mostly of 20-60 cm with frequent bare patches of >2 m ² , 10-20% bare ground and <50% tree/scrub cover overall; trees <2 m in height) throughout the nesting area.	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/rearing/concealment/roosting. In the Brecks conifer plantation-forest is a key habitat for breeding Nightjar. Within large plantation-forest landscapes, a variety of growth stages is important for this species and grazing of open habitats within and adjacent to the Forest will provide additional benefit.	This attribute will be periodically monitored as part of Natural England's site condition assessments .
Version Control 7 March 2019: Table updated following feedback from stakeholders: Population abundance: additional text included to provide contextual information regarding baseline numbers.				
Variations from national feature-framework of integrity-guidance: All three Annex 1 bird species are associated with terrestrial habitats and therefore the attribute relating to features dependent on the quality and quantity of surface water has been removed.				

Table 3: Supplementary Advice for Qualifying Features: A246. *Lullula arborea*; Woodlark (Breeding)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Breeding population within the SPA	Population abundance	Restore the size of the breeding Woodlark population to a level which is above 430 pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	See the supporting notes for this attribute in Table 1 above. The Breckland SPA breeding population of Woodlark is cited as 430 pairs at 1997. Usual practice for setting a Conservation Objective normally relies on several years' data, commonly five consecutive years, which is presented as a mean value. In the case of less well monitored species, it may be necessary to use a single year's data to establish a population baseline. It is the population present in the 1997 survey which is used here to set the population baseline. Nightjar and woodlark were at unusually high population levels at this point due to unsustainable levels of habitat availability. In Thetford Forest habitat (open/felled/ re-stock) availability peaked in the 1980s and 90s when the first forest plantings reached economic maturity and were harvested in a narrow time window. This has led to unrealistically high baseline numbers. Since then both Woodlark and Nightjar numbers have declined in the SPA. Research has shown this is mainly due to decreased habitat availability. The Forestry Commission are currently working with University of East Anglia to understand potential long-term population levels when based on a 'steady-state' of harvesting within the forest and taking into account the emergence of tree diseases and projected climate change forecasts, both of which are likely to drive a significant change in silviculture i.e. reduction of rotational clear fell. The population baseline may be revised in light of this work.	DOLMAN, P. & MORRISON, C. 2012. Temporal Change in Territory Density and Habitat Quality for Breckland Forest SSSI Woodlark and Nightjar Populations. Unpublished report for Forestry Commission and Natural England. WOTTON, S.R. & GILLINGS, S. 2000. The status of breeding Woodlarks <i>Lullula arborea</i> in Britain in 1997. Bird Study 47: 212–224.
Supporting habitat (both within and outside the SPA): function/ supporting process	Air quality	Restore as necessary the concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See the supporting notes for this attribute in Table 1 above. Grass heath vegetation in Breckland is dependent on low nutrient conditions and is thus vulnerable to aerial nitrogen deposition. The region has one of the highest levels of deposition in Britain, with the current critical load being 10-20 kg N/ha/yr. An increase in nitrogen deposition changes the diversity and composition of vegetation, with the result that less competitive species are replaced by those of a more vigorous nature. The reduction in the level of short vegetation and bare ground favoured by	More information about site-relevant Critical Loads and Levels for this SPA is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Woodlark reduces the amount of available nesting and feeding habitat. Management techniques to mitigate nitrogen accumulation impacts are imperfectly understood, but the use of soil disturbance, turf stripping and encouraging high density rabbit populations are approaches being trialled in Breckland.	
Supporting habitat (both within and outside the SPA): function/ supporting process	Conservation measures	Maintain management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain the structure, function and/or the supporting processes associated with the feature and its supporting habitats.	Active and ongoing conservation management is often needed to protect, maintain or restore this feature at this site. Other measures may also be required, and in some cases, these measures may apply to areas outside of the designated site boundary in order to achieve this target. Further details about the necessary conservation measures for this site can be provided by Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Conservation Measures: • Maintenance of semi-natural grasslands and heathlands to ensure the availability of sufficient levels of optimal foraging and nesting habitat. This will include a scatter of trees as song posts, and a mosaic of sward heights and bare ground for nesting. • Maintenance of optimal sward height and sward composition on semi-natural grasslands and heathlands through grazing by livestock and rabbits. • Maintenance of bare/disturbed ground on semi-natural grassland through a range of intermittent physical disturbance techniques e.g. rotovating, ploughing or turf-stripping. • Maintenance of forestry restocks to ensure key nesting habitat in conifer plantation-forest. In Breckland woodlark predominantly use clearings and young tree crops within forestry plantations, and tend not to use smaller coupe sizes, especially those under 5ha in size. They continue to use young plantations up to five years old, with breeding density declining as the crop mature.	ENGLISH NATURE, 2005. Views about Management of Brecklands SSSIs See https://designatedsites.naturalengland.org.uk/ NATURAL ENGLAND 2015. Site Improvement Plan: Breckland (SIP025). http://publications.naturalengland.org.uk/publication/5075188492271616 WRIGHT, L. 2006. Demography and Productivity of Woodlarks <i>Lullula arborea</i> in Breckland. Unpublished PhD thesis. University of East Anglia, Norwich.
Supporting habitat	Food availability	Maintain the distribution, abundance and availability of key	The availability of an abundant food supply is critically important for successful breeding, adult fitness and survival and the overall	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
(both within and outside the SPA): function/supporting process	within supporting habitat	prey items (e.g. spiders, weevils, caterpillars) at preferred prey sizes.	sustainability of the population. As a result, inappropriate management and direct or indirect impacts which may affect the distribution, abundance and availability of prey may adversely affect the population. Presence and abundance of spiders, beetles and caterpillars, should be maintained within the forest and surrounding semi-natural grasslands and heathlands. On semi-natural grasslands and heathlands, management of vegetation should achieve a mosaic of sward heights and a high proportion of nectar-rich wildflowers to create optimal habitat for invertebrates.	
Supporting habitat (both within and outside the SPA): structure	Landscape	Maintain the area of open and unobstructed terrain, typically within at least 0.2 km of nesting areas, with no increase in tall (>0.2 m) vegetation cover to >50% of the site overall.	Woodlark are known to favour large areas of open terrain, largely free of obstructions, in and around its nesting, roosting and feeding areas. Often there is a need to maintain an unobstructed line of sight within nesting, feeding or roosting habitat to detect approaching predators, or to ensure visibility of displaying behaviour. An open landscape may also be required to facilitate movement of birds between the SPA and any off-site supporting habitat.	
Supporting habitat (within the SPA): disturbance	Disturbance caused by human activity	Ensure the frequency, duration and/or intensity of disturbance affecting nesting, roosting, foraging, feeding, should not reach levels that significantly affect the breeding Woodlark population.	The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population (Dolman, 2010). This may undermine successful nesting, rearing, feeding and/or roosting, and/or may reduce the availability of suitable habitat as birds are displaced and their distribution within the site contracts. Disturbance associated with human activity may take a variety of forms including noise, light, sound, vibration, trampling, and presence of people, animals and structures. Woodlark are known to be sensitive to human-related disturbance. Research investigating the impact of disturbance on Woodlark populations on heathlands, found that Woodlark density was lower on sites with higher levels of human disturbance (Mallord <i>et al.</i>, 2007). Liley <i>et al</i>, 2007 studied the impacts of recreational disturbance on Annex1 breeding bird species which included Nightjar and Woodlark. This work focused on disturbance on heathland sites in Dorset where a negative correlation between the numbers of these species and housing was identified i.e. higher density of housing resulted in fewer birds on the	DOLMAN, P M., 2010. Woodlark and Nightjar Recreational Disturbance and Nest Predator Study. 2008 and 2009. Final Report to Breckland District Council. University of East Anglia, Norwich. MALLORD, J W., DOLMAN, P M., BROWN, A F., and SUTHERLAND W J., 2007. Linking recreational disturbance to population size in a ground-nesting

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			heaths. The research shows that the impact of housing situated close to heaths is more severe than housing that is further away. As a result of these findings a 400m zone around the heaths was proposed within the local plan as a suitable distance at which to totally limit further development around the boundaries of heathland sites. The 400m zone, as selected by Natural England, is regarded as a pragmatic distance to represent the zone of highest potential impact on the SPA from new residential development. The figure is based on a number of different impacts and the difficulty of avoiding their occurrence when housing is adjacent to heaths. In particular: - Residents living very close to the heaths are more likely to visit the heaths than people living further away; - Cats associated with housing adjacent to the heaths may be more likely to visit the heaths; and - Other effects, such as garden waste dumping, garden extensions and fly-tipping from gardens, all occur where housing is adjacent or very close to the heaths. This 400m zone has been adopted by Breckland Council following a comprehensive study undertaken as part of the Habitat Regulations Assessment (HRA) of its Core Strategy. Any development proposal that lies within 400m of the Breckland SPA must be able to demonstrate, through a local level HRA, that the Woodlark and Nightjar interest features of the SPA will not be adversely affected by the proposal. The exclusion zone has subsequently been adopted by all the local authorities where the SPA boundary falls under their jurisdiction.	passerine. Journal of Applied Ecology, 44(1), pp.185–195. LILEY, D., CLARKE, R. T., TYLDESLEY, D., UNDERHILL-DAY, J. & LOWEN, J. 2007 Evidence to support the Appropriate Assessment of development plans and projects in south-east Dorset Footprint Ecology / Dorset County Council.
Supporting habitat (within the SPA): extent and	Extent and distribution of supporting breeding habitat	Restore the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle	Conserving and restoring the extent of supporting habitats and their range will be key to maintaining the site's ability and capacity to support the SPA population. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending to the nature, age and accuracy of data collection.	This attribute will be periodically monitored as part of Natural England's site condition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
distribution		(courtship, nesting, feeding). Maintain at least 12,752 ha in rotational forest management	Grass heath within the SPA Semi-natural grassland and heathland, including those within planted forests, need to be maintained to ensure the availability of optimal foraging and nesting habitat. Birds that choose to nest in restocked forestry blocks will often use open habitats for feeding. There is an ongoing plan to increase the open habitat within the forest to reverse the effects of fragmentation, and to provide optimal foraging grounds to support nesting Woodlark (Open Habitats Implementation Plan for the Forestry Commission). Conifer Plantation Forest within the SPA The large majority of Woodlark nesting in the SPA do so on forest restocks. The overall area of suitable habitat with the correct vegetation characteristics for nesting and feeding should be maintained, although the distribution will vary as areas of plantation mature or are felled. At present, at least 12,752ha in rotational forest management is considered to be needed to ensure the continuity in the extent of nesting habitat. This figure is currently under review and may need to be amended in light of work being carried out by the Forestry Commission in relation to changes in the silvicultural management of the Forest. This is partly driven by the emergence of tree diseases and projected climate change forecasts, both of which are likely to drive a significant change in silviculture i.e. reduction of rotational clear fell	assessments. FORESTRY COMMISSION, 2014. Open Habitats Implementation Plan Thetford Public Forest Estate
Supporting habitat (within the SPA): predation	Predation	Reduce predation of and disturbance to breeding Woodlark caused by native and non-native predators.	This will ensure that breeding productivity (number of chicks per pair) and survival are sustained at rates that maintain or restore the abundance of the feature. Impacts to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also from significant disturbance. The presence of predators can influence bird behaviours, such as abandonment of nest sites or reduction of effective feeding. Woodlark nests in the Breckland SPA are predated by a variety of	DOLMAN P M., 2010. Woodlark and Nightjar Recreational Disturbance and Nest Predator Study 2008 and 2009: Final Report to Breckland District Council.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			predators, including mammals, birds and reptiles. High nest predation rates remain an important aspect of population demography and numbers within the Breckland SPA. Where evidence suggests predator management is required, measures can include their exclusion through fencing and scaring or by direct control. Any such measures must consider the legal protection of some predators, as well as the likely effects of such control on other qualifying features.	University of East Anglia, Norwich.
Supporting habitat (within the SPA): structure	Vegetation characteristic	Restore the mix of trees, ground vegetation and bare ground (including frequency of bare patches of <0.5 ha within mosaic of short (<5 cm) to medium (10-20 cm) ground vegetation, and small clumps of shrubs or trees scattered throughout nesting and feeding areas.	The height, cover, variation and composition of vegetation are often important characteristics of habitats supporting this feature which enable successful nesting/rearing/concealment/roosting and/or displaying. Many bird species will have specific requirements that conservation measures will aim to maintain, for others such requirements will be less clear. Activities that may directly or indirectly affect the vegetation of supporting habitats and modify these characteristics may adversely affect the feature. Woodlarks require short, sparse vegetation, less than 5cm high, together with fine mosaics of short and taller vegetation. This combined with areas of bare ground for foraging. Early forest restocks, with abundant disturbed, bare ground and short vegetation often provide these ideal conditions for Woodlarks.	This attribute will be periodically monitored as part of Natural England's site condition assessments. MALLORD, J W., DOLMAN, P M., BROWN, A F., and SUTHERLAND W J., 2006. Linking recreational disturbance to population size in a ground-nesting passerine. Journal of Applied Ecology, 44(1), pp.185–195.
Version Control 7 March 2019: Table updated following feedback from stakeholders: Population abundance: additional text included to provide contextual information regarding baseline numbers.				
Variations from national feature-framework of integrity-guidance: All three Annex 1 bird species are associated with terrestrial habitats and therefore the attribute relating to features dependent on the quality and quantity of surface water has been removed.				